



California Regional Water Quality Control Board San Diego Region



Linda S. Adams
Secretary for
Environmental
Protection

Over 50 Years Serving San Diego, Orange, and Riverside Counties
Recipient of the 2004 Environmental Award for Outstanding Achievement from USEPA

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9174 Sky Park Court, Suite 100, San Diego, California 92123-4340
(858) 467-2952 • Fax (858) 571-6972
[http:// www.waterboards.ca.gov/sandiego](http://www.waterboards.ca.gov/sandiego)

January 13, 2008

In reply refer to: NWU:18-2007020:mmills

Craig Eaker
Southern California Edison
Environmental Projects, GO1
2244 Walnut Grove Avenue
Rosemead, CA 91770

WDID: 9 000001614
CIWQS:
Party ID No. 44116
Place No. 647645
Regulatory Measure: 321839

Dear Mr. Eaker:

SUBJECT: Action on Request for Clean Water Act Section 401 Water Quality Certification for the Phase 2 Mitigation Reef of the SONGS Units 2 & 3 Kelp Artificial Mitigation Reef (401 Project No. 07C-020).

Enclosed find Clean Water Act Section 401 Water Quality Certification for discharge to Waters of the U.S. for the Phase 2 Mitigation Reef of the SONGS Units 2 & 3 Kelp Artificial Mitigation Reef. A description of the project and project location can be found in the project information sheet, project location map, and project site maps, Attachments 1 through 3.

Any petition for reconsideration of this Certification must be filed with the State Water Resources Control Board within 30 days of certification action (23 CCR § 3867). If no petition is received, it will be assumed that you have accepted and will comply with all the conditions of this Certification.

Failure to comply with all conditions of this Certification may subject you to enforcement actions by the California Regional Water Quality Control Board, San Diego Region (Regional Board), including administrative enforcement orders requiring you to cease and desist from violations, or to clean up waste and abate existing or threatened conditions of pollution or nuisance; administrative civil liability in amounts of up to \$10,000 per day per violation; referral to the State Attorney General for injunctive relief; and, referral to the District Attorney for criminal prosecution.

The heading portion of this letter includes a Regional Board code number noted after "In reply refer to:" In order to assist us in the processing of your correspondence please include this code number in the heading or subject line portion of all correspondence and reports to the Regional Board pertaining to this matter.

California Environmental Protection Agency

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at <http://www.swrcb.ca.gov>.

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Mr. Eaker, Southern California Edison
401 Certification 07C-020

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January 13, 2008

If you have any questions regarding this notification, please contact Mariah Mills at
(858) 627-3977 or mmills@waterboards.ca.gov.

Respectfully,


JOHN H. ROBERTUS
Executive Officer

Enclosure:

Clean Water Act Section 401 Water Quality Certification for the Phase 2 Mitigation Reef
of the SONGS Units 2 & 3 Kelp Artificial Mitigation Reef (401 Project No. 07C-020)

Cc via email only:

Colin Connor, California State Lands Commission, ConnorC@slc.ca.gov

Jason Lambert, U.S. Army Corps of Engineers, Los Angeles District,
jason.p.lambert@usace.army.mil

Susan Hansch, California Coastal Commission, shansch@coastal.ca.gov

Bill Orme, State Water Resources Control Board, Division of Water, Quality 401 Water
Quality Certification and Wetlands Unit, BOrme@waterboards.ca.gov

David W. Smith, Wetlands Regulatory Office, U.S. Environmental Protection Agency, Region 9
smith.davidw@epa.gov

California Environmental Protection Agency



Linda S. Adams
Acting Secretary for
Environmental
Protection

California Regional Water Quality Control Board ^{RF} San Diego Region



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<http://www.waterboards.ca.gov/sandiego>

Action on Request for Clean Water Act Section 401 Water Quality Certification and Waiver of Waste Discharge Requirements for Discharge of Dredged and/or Fill Materials

PROJECT: Phase 2 Mitigation Reef of the SONGS Units 2 & 3 Kelp
Artificial Mitigation Reef (401 Project No. 07C-020)
(WDID no. 9000001614)

APPLICANT: Craig Eaker
Southern California Edison
Environmental Projects, GO1
2244 Walnut Grove Avenue
Rosemead, CA 91770

CIWQS Reg. Mes. ID: 321839 Place ID: 647645 Party ID: 44116
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ACTION:

- | | |
|---|---|
| <input type="checkbox"/> Order for Low Impact Certification | <input type="checkbox"/> Order for Denial of Certification |
| <input checked="" type="checkbox"/> Order for Technically-conditioned Certification | <input type="checkbox"/> Waiver of Waste Discharge Requirements |
| <input checked="" type="checkbox"/> Enrollment in Order No. 2003-017 DWQ | <input type="checkbox"/> Enrollment in Isolated Waters Order No. 2004-004 DWQ |

STANDARD CONDITIONS:

The following three standard conditions apply to all certification actions, except as noted under Condition 3 for denials (Action 3).

1. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to section 13330 of the California Water Code and section 3867 of Title 23 of the California Code of Regulations (23 CCR).
2. This certification action is not intended and must not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR subsection 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

California Environmental Protection Agency

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Recycled Paper



3. The validity of any non-denial certification action (Actions 1 and 2) must be conditioned upon total payment of the full fee required under 23 CCR section 3833, unless otherwise stated in writing by the certifying agency.

ADDITIONAL CONDITIONS:

In addition to the three standard conditions, Southern California Edison must satisfy the following:

A. GENERAL CONDITIONS

1. Southern California Edison must, at all times, fully comply with the engineering plans, specifications and technical reports submitted to the California Regional Water Quality Control Board, San Diego Region (Regional Board), to support this 401 Water Quality Certification and all subsequent submittals required as part of this certification and as described in Attachment 1. The conditions within this certification must supersede conflicting provisions within such plans submitted prior to the certification action.
2. During construction, Southern California Edison must maintain a copy of this certification at the project site so as to be available at all times to site personnel and agencies.
3. Southern California Edison must permit the Regional Board or its authorized representative at all times, upon presentation of credentials:
 - a. Entry onto project premises, including all areas on which wetland fill or wetland mitigation is located or in which records are kept.
 - b. Access to copy any records required to be kept under the terms and conditions of this certification.
 - c. Inspection of any treatment equipment, monitoring equipment, or monitoring method required by this certification.
 - d. Sampling of any discharge or surface water covered by this Order.
4. Southern California Edison must notify the Regional Board within 24 hours of any unauthorized discharge, including hazardous or toxic materials, to waters of the U.S. and/or State; measures that were implemented to stop and contain the discharge; measures implemented to clean-up the discharge; the volume and type of materials discharged and recovered; and additional best management practice (BMPs) or other measures that will be implemented to prevent future discharges.
5. Southern California Edison must, at all times, maintain appropriate types and sufficient quantities of materials onsite to contain any spill or inadvertent

release of materials that may cause a condition of pollution or nuisance if the materials reach waters of the U.S. and/or State.

6. This Certification is not transferable to any person except after notice to the Executive Officer of the Regional Board. Southern California Edison must notify the Regional Board of any change in ownership of the project area. Notification must include, but not be limited to, a statement that the property owner has provided the purchaser with a copy of the Section 401 Water Quality Certification and that the purchaser understands the permit requirements and must implement them; the seller and purchaser must sign and date the notification. The notification for transfer of mitigation responsibility shall include a signed statement from the new party demonstrating acceptance and understanding of the responsibility to meet the mitigation conditions and applicable requirements of the Certification. Notification must be provided within **10 days** of the sale of the property.
7. In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation must be subject to any remedies, penalties, process or sanctions as provided for under State law. For purposes of section 401(d) of the Clean Water Act, the applicability of any State law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification.
8. In response to a suspected violation of any condition of this certification, the Regional Board may require the holder of any permit or license subject to this certification to furnish, under penalty of perjury, any technical or monitoring reports the Regional Board deems appropriate, provided that the burden, including costs, of the reports must bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports.
9. In response to any violation of the conditions of this certification, the Regional Board may add to or modify the conditions of this certification as appropriate to ensure compliance.
10. Southern California Edison and successor owners must submit annual progress reports to the Regional Board prior to **August 1** of each year following the issuance of this certification until the project has reached completion. At minimum, the annual reports must include the status of construction activities and reef monitoring. If no progress has been made on the project, the annual report must state this.

B. PROJECT CONDITIONS

1. Prior to the start of the project, Southern California Edison must educate all personnel on the requirements in this certification, pollution prevention measures, spill response, and BMP implementation and maintenance.
2. Southern California Edison must notify the Regional Board in writing at least **5 days** prior to the actual commencement of dredge, fill, and discharge activities.
3. Southern California Edison must comply with the requirements of State Water Resources Control Board Water Quality Order No. 2003-017-DWQ, Statewide General Waste Discharge Requirements for discharges of dredged or fill material that have received State Water Quality Certification. These General Waste Discharge Requirements are accessible at http://www.waterboards.ca.gov/cwa401/docs/generalorders/go_wdr401regulated_projects.pdf.
4. Water containing mud, silt, or other pollutants from equipment washing or other activities, must not be discharged to waters of the United States and/or the State or placed in locations that may be subjected to storm flows.
5. Substances hazardous to aquatic life including, but not limited to, petroleum products, raw cement/concrete, asphalt, and coating materials, must be prevented from entering waters of the United States and/or State. BMPs must be implemented to prevent such discharges during each project activity involving hazardous materials.
6. Average coverage of quarry rock for the 150-acre mitigation reef must be between 42% and 86%.
7. All quarry rock used to construct the reef must conform to the California Department of Fish and Game material specification guidelines for augmentation of artificial reefs, included as Appendix D of the *Final Design Plan – Wheeler North Reef at San Clemente, California (SONGS Artificial Reef Mitigation Project, Phase 2 Mitigation Reef)* (Final Design Plan), dated December 10, 2007. The rock used for reef construction must be clean and free of any contaminants, especially those that could dissolve in seawater.
8. Southern California Edison is responsible for verifying that all quarry rock used to construct the reef has dimensions, specific gravities and durability that are within the range of the rock and concrete boulders used to construct the experimental portion of the reef and that conform to California Department of Fish and Game material specification guidelines for augmentation of artificial reefs.

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9. During construction, impacts to biological communities on existing hard substrate must be minimized. Anchors must not be set in areas that will impact existing hard substrate. Buoys must be used to minimize the amount of chain dragging on the ocean bottom. Monitoring must be implemented during reef construction to look for signs of biological damage caused by anchor lines, vessel relocation, misplacement of reef material and other construction related activities.

10. Reef construction operations may not cause turbidity plumes in excess of natural turbidity as compared to nearby, offshore areas that are not in the construction footprint. Turbidity shall be monitored by a qualified observer during each day of construction. If visual monitoring indicates turbidity greater than ambient one-half mile from the discharge site at any time for two (2) consecutive days, then:
 - a) The monitor shall immediately advise the Regional Board, Army Corps of Engineers, California Department of Fish and Game and the California Coastal Commission.

 - b) The discharger shall comply with any measures identified by the Regional Board, in consultation with other responsible agencies as appropriate, to mitigate project-related turbidity, including modifying or halting discharge.

 - c) If turbidity persists on the third day, the Regional Board may require that Southern California Edison to commence daily water clarity testing and reporting to the Regional Board, Army Corps of Engineers, California Department of Fish and Game and the California Coastal Commission. Testing shall consist of measuring transmission of light through the water using a transmissometer. Daily testing shall continue until no project-related turbidity is detectable (i.e., until offshore and downcoast readings return to ambient). Testing shall be designed to document the areal extent and concentration of the turbidity plume at the time of day it is most developed, and shall include at least: samples taken as close as practicable to the discharge site, one-half mile upcoast of the discharge site, one-half mile offshore from the discharge site, and one-half mile downcoast of the discharge site (minimum four samples). Sampling shall be done at mid-depth in the water column. These sampling protocols may be modified with the Regional Board's written approval. The applicant shall document logistical arrangements for such potential water quality sampling and shall include draft quality assurance/quality control protocols in the project's MMRP or, if this is not required to be submitted, then as part of a "Turbidity Monitoring Plan" in the RGP 67 application.

- d) If turbidity is greater than ambient one-half mile from the discharge site (either offshore or downcoast) for five (5) consecutive days, the discharge shall be halted or modified to reduce turbidity.
11. Southern California Edison must implement all necessary BMPs to prevent a discharge of pollutants to marine waters including, but not limited to, the measures described in Appendix F of the Final Design Plan. In the event of an accidental discharge during construction, Southern California Edison and its contractor must comply with the measures outlined in the Final Design Plan to reduce impacts to water quality.
12. Southern California Edison must implement a quality control audit after the construction of the first two reef polygons to ensure compliance with all construction and material specifications. Engineering change notices will be issued if needed to bring the project into compliance. Upon acceptance of the two audit polygons, construction will continue on the remaining polygons to complete the reef.
13. Southern California Edison must implement the construction monitoring and quality control procedures described in Sections 7.0 and 8.0 of the Final Design Plan. Construction monitoring, including sonar and diver ground-truthing surveys, must be implemented to determine the dimensions and areas of the constructed polygons, to determine the density of boulder deposition, to verify that boulder deposition avoids habitat of significant biological value and to determine whether the constructed reef adheres to the design specifications in the Final Design Plan.

C. POST CONSTRUCTION MONITORING AND MANAGEMENT

1. Upon completion of construction, the reef must be monitored and managed in accordance with California Coastal Commission Coastal Development Permit (CPD) 6-81-330A or the pending Coastal Development Permit for the project for a time period equal to the operating life on SONGS Units 2 and 3.
2. Southern California Edison must submit copies of all reports prepared pursuant to the monitoring required in California Coastal Commission Coastal Development Permit 6-81-330A or the pending Coastal Development Permit for the project to the Regional Board.
3. Within 90 days following construction of the artificial reef, Southern California Edison must submit a final post-construction survey to the Regional Board. The survey must be based on high-resolution sonar and diver observations. The report must include a map showing the perimeter and position of each reef polygon, the average topographic relief of each polygon, average percentage of seafloor covered with quarry rock within each polygon and any other items

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polygon, the average topographic relief of each polygon, average percentage of seafloor covered with quarry rock within each polygon and any other items specified by the California Coastal Commission in the pending Coastal Development Permit for the project.

D. POST CONSTRUCTION MONITORING AND MANAGEMENT

1. Southern California Edison must conduct photo documentation of the project during and after project construction. Photo documentation must be conducted in accordance with the State Water Resources Control Board Standard Operating Procedure 4.2.1.4: Photo Documentation Procedure, included as Attachment 4. In addition, photo documentation must include Geographic Positioning System (GPS) coordinates for each of the photo points referenced. The Applicant must submit this information in a photo documentation report to the Regional Board with the final post-construction survey. The report must include a compact disc that contains digital files of all the photos (jpeg file type or similar).

E. GEOGRAPHIC INFORMATION SYSTEM REPORTING

1. Southern California Edison must submit Geographic Information System (GIS) shape files of completed mitigation reef within 90 days of completion of reef construction. All shapefiles must be polygons. Two GPS readings (points) must be taken on each line of the polygon and the polygon must have a minimum of 10 points. GIS metadata must also be submitted.

F. REPORTING

1. All information requested in this Certification is pursuant to California Water Code (CWC) section 13267. Civil liability may be administratively imposed by the Regional Board for failure to furnish requested information pursuant to CWC section 13268.
2. All reports and information submitted to the Regional Board must be submitted in both hardcopy and electronic format.
3. All applications, reports, or information submitted to the Regional Board must be signed and certified as follows:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

4. Southern California Edison must submit reports required under this certification, or other information required by the Regional Board, to:

Executive Officer
California Regional Water Quality Control Board
San Diego Region
Attn: 401 Certification; Project No. 07C-020
9174 Sky Park Court, Suite 100
San Diego, California 92123

6. Required Reports: The following list summarizes the reports, excluding spill notifications and emergency situations, required per the conditions of this Certification to be submitted to the Regional Board.

Report Topic	Certification Condition	Due Date(s)
Annual Progress Reports	A.10	Prior to August 1 of each year until project is complete
Notification	B.2	5 days prior to reef construction
Reef monitoring reports	C.2	Per California Coastal Commission requirements
Post-construction reef survey	C.3	Within 90 days of completion of reef construction
Photo documentation	D.1	Within 90 days of completion of reef construction
GIS shapefiles of the reef	E.1	Within 90 days of completion of reef construction

G. SIGNATORY REQUIREMENT

1. All applications, reports, or information submitted to the Regional Board must be signed as follows:
 - a) For a corporation, by a responsible corporate officer of at least the level of vice president.
 - b) For a partnership or sole proprietorship, by a general partner or proprietor, respectively.
 - c) For a municipality, or a state, federal, or other public agency, by either a principal executive officer or ranking elected official.

2. A duly authorized representative of a person designated in Items G.1.a. through G.1.c. above may sign documents if:
 - a) The authorization is made in writing by a person described in Items G.1.a. through G.1.c. above.
 - b) The authorization specifies either an individual or position having responsibility for the overall operation of the regulated activity.

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PUBLIC NOTIFICATION OF PROJECT APPLICATION:

On March 12, 2007 receipt of the project application was posted on the Regional Board web site to serve as appropriate notification to the public.

REGIONAL WATER QUALITY CONTROL BOARD CONTACT PERSON:

Mariah Mills
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123
858-627-3977
mmills@waterboards.ca.gov

WATER QUALITY CERTIFICATION:

I hereby certify that the proposed discharge from the Phase 2 Mitigation Reef of the SONGS Units 2 & 3 Kelp Artificial Reef Project (Project No. 07C-020) will comply with the applicable provisions of sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under State Water Board Order No. 2003-0017-DWQ, "General Waste Discharge Requirements for Dredged or Fill Discharges that have Received State Water Quality Certification," which requires compliance with all conditions of this Water Quality Certification.

Except insofar as may be modified by any preceding conditions, all certification actions are contingent on (a) the discharge being limited and all proposed mitigation being completed in strict compliance with the applicants' project description and/or on the attached Project Information Sheet, and (b) on compliance with all applicable requirements of the Regional Water Quality Control Board's Water Quality Control Plan (Basin Plan).


JOHN H. ROBERTUS
Executive Officer
Regional Water Quality Control Board

1/7/2008
Date

- Attachments: 1. Project Information
2. Location Map
3. Site Maps
4. Photo Documentation Procedures

**ATTACHMENT 1
PROJECT INFORMATION**

- Applicant: ✓ Southern California Edison
Environmental Projects, GO1
2244 Walnut Grove Avenue
Rosemead, CA 91770
Attn: Craig Eaker
Telephone: (626) 302-8531
Fax: (626) 302-9130
Email: Craig.Eaker@sce.com
- Project Name: ✓ Phase 2 of the SONGS Units 2 & 3 Kelp Artificial Reef Mitigation Project
- Project Location: ✓ The project site encompasses 356 acres of sand substrate suitable for reef construction within an 862-acre lease area identified by the California State Lands Commission. The site is located approximately 0.6 miles offshore along a 2.5 mile stretch of beach between the City of San Clemente Pier to the northwest and San Mateo Point to the southeast in Orange County, California. The project area is located in water depths of approximately 11 to 15 meters. Latitude 33 23'30N, longitude 117 37'0"W. See Attachment 2 for location map.
- Type of Project: ✓ Artificial Kelp Reef
- Project Description: ✓ This project is intended to complete the kelp reef habitat creation required to mitigate the environmental impacts on the San Onofre kelp bed resulting from the operation of the San Onofre Nuclear Generating Station Units 2 and 3 (SONGS) cooling system, per California Coastal Commission (CCC) Coastal Development Permit (CDP) No. 6-81-330A.
- Southern California Edison is required to create 150 acres of kelp forest habitat. Reef creation was undertaken in two phases. Phase 1, a 22.4-acre experimental reef consisting of 56 modules, was constructed in 1999. The Phase 1 reef was monitored for 5 years and the results were used to provide insight into the artificial substrate types and configurations that will have the greatest chance of meeting CCC performance standards. Phase 2, subject to this Certification, consists of the construction of the remaining 127.6 acres of reef.
- To complete Phase 2, Southern California Edison proposes to place approximately 100,800 tons of quarry rock in a single layer on the seafloor to create 127.6 acres of kelp reef habitat. The reef design consists of 11 polygons varying in size from 2.4 to 37.5 acres constructed amongst the original 56 modules. An additional five

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polygons (22.4 acres total) are designated as contingency reef construction areas. The quarry rock will be supplied by the Pebbly Beach Quarry located on Santa Catalina Island, all rock will comply with California Department of Fish and Game material specification guidelines for augmentation of artificial reefs. The mitigation reef will be managed and monitored for a period equal to the operating life of SONGS, per CDP No. 6-81-330A.

Federal Agency/Permit: ✓ U.S. Army Corps of Engineers §404 Individual Permit – Jason Lambert

Other Required Regulatory Approvals: ✓ California Coastal Commission Coastal Development Permit No. 6-81-330-A (formerly 183-73) – Susan Hansch; California State Lands Commission Lease Agreement PRC 8097.1 – Colin Connor;

California Environmental Quality Act (CEQA) Compliance: ✓ California State Lands Commission *Final Program Environmental Impact Report for the Construction and Management of an Artificial Reef in the Pacific Ocean near San Clemente, CA*, May 1999, SCH 9803127.

Receiving Water: ✓ Pacific Ocean near San Clemente, CA.

Impacted Waters of the United States: ✓ Permanent:
Ocean – 127.6 acres

Dredge Volume: None

Related Projects Implemented/to be Implemented by the Applicant(s): ✓ Southern California Edison constructed Phase I of the kelp reef mitigation project in 1999, see Project Description above. Phase 1 was issued a Section 401 waiver on June 16, 1999.

Compensatory Mitigation: ✓ No compensatory mitigation is proposed, as this is a mitigation project and is expected to increase habitat value and beneficial uses in the marine environment offshore of San Onofre.

Best Management Practices (BMPs): ✓ Southern California Edison will implement all necessary BMPs to prevent a discharge of pollutants to marine waters including, but not limited to, the measures described in Appendix D of the *Final Design Plan – Wheeler North Reef at San Clemente, California (SONGS Artificial Reef Mitigation Project, Phase 2 Mitigation Reef)* (Final Design Plan), dated December 10, 2007. In the event of an accidental discharge during construction, Southern California Edison and its contractor must comply with the measures outlined in the Final Design Plan to reduce impacts to water quality.

Public Notice: ✓ March 12, 2007

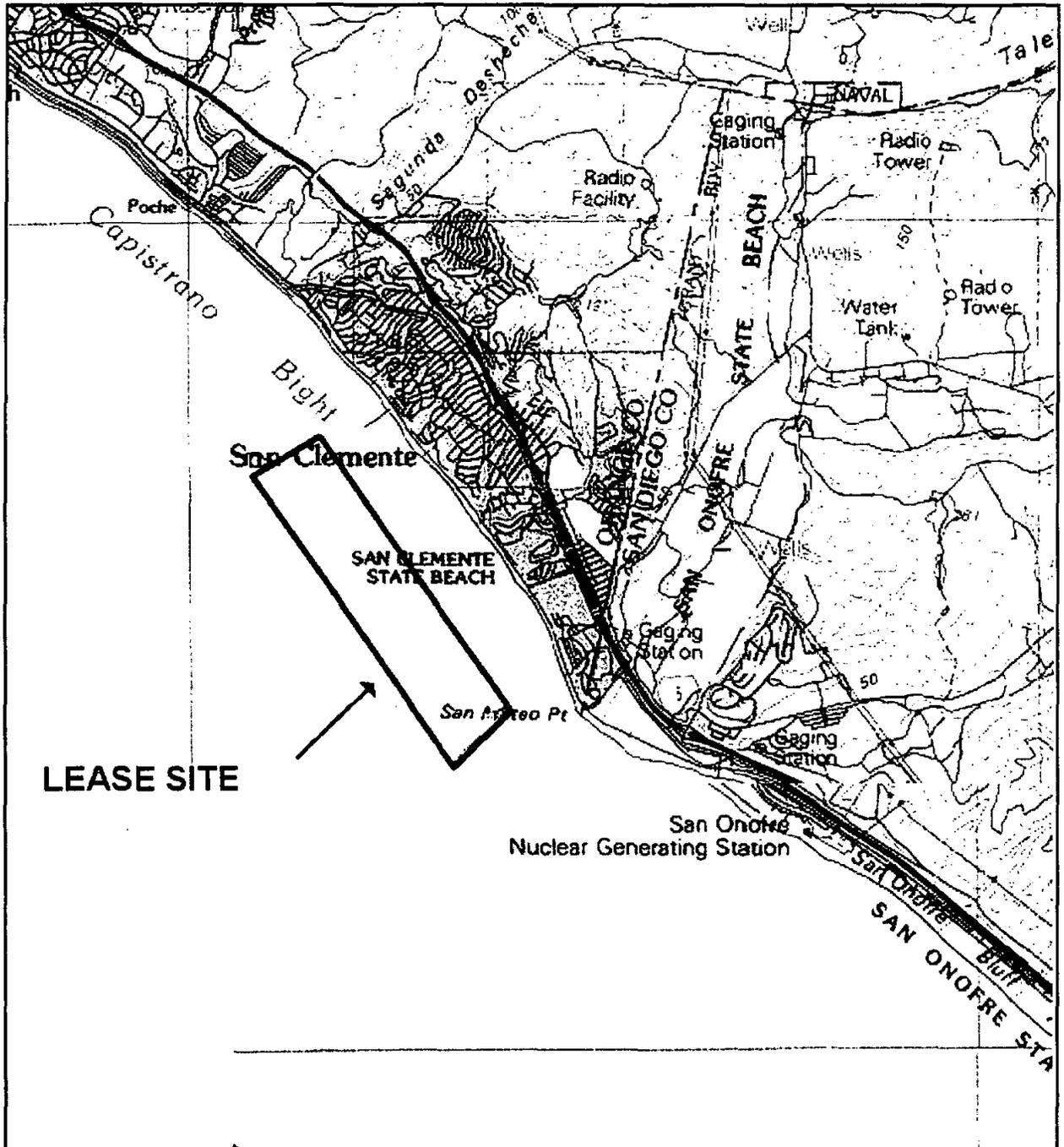
Phase 2 Mitigation Reef of the SONGS
Units 2 & 3 Kelp Artificial Mitigation Reef

07C-020

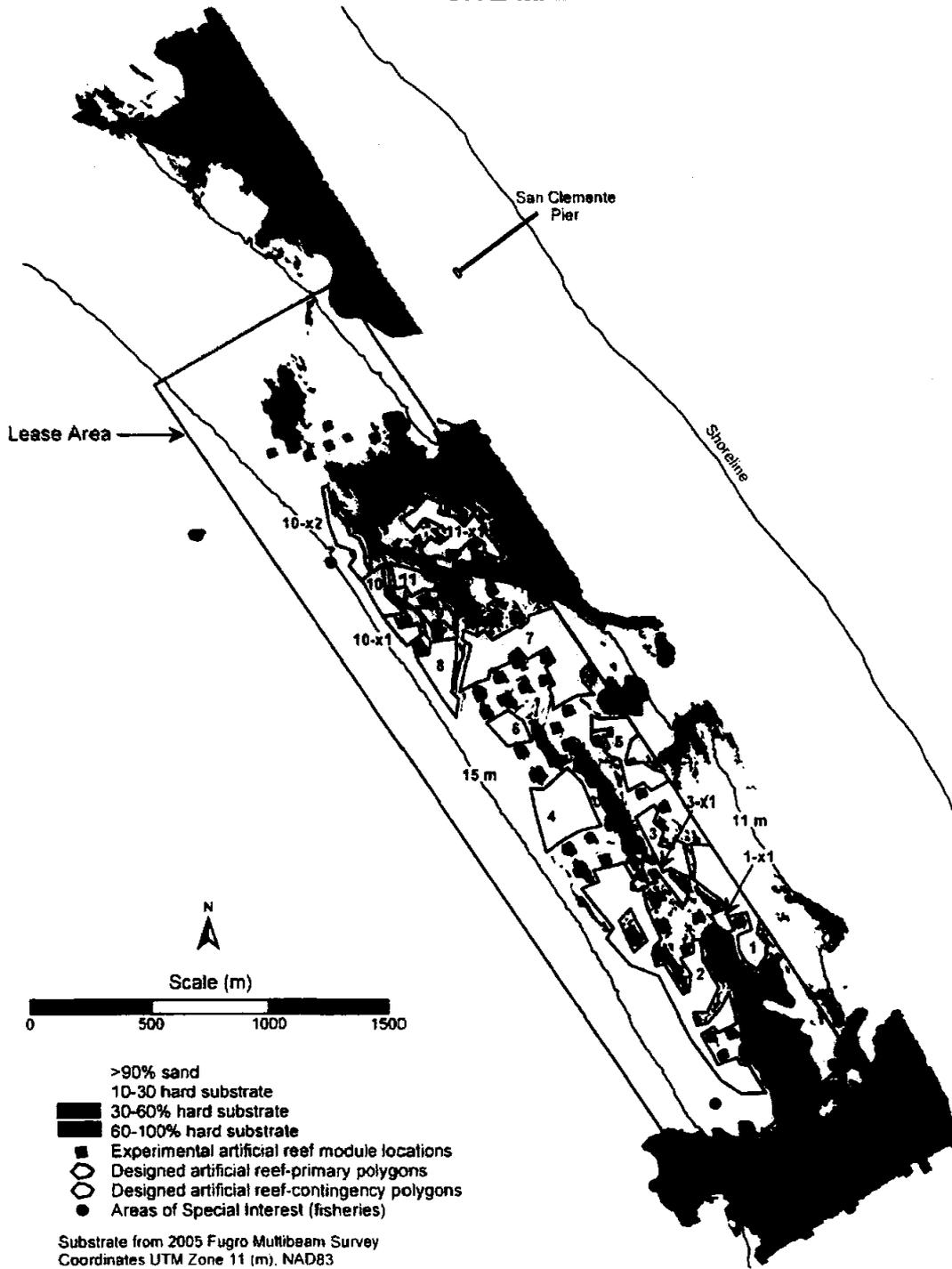
Fees: Total Fees: \$40,000.00
Total Paid: \$3,535.31 (check No. 3082059)
\$36,464.69 (check No. 3108363)

CIWQS: Regulatory Measure ID: 321839
Place ID: 647645

ATTACHMENT 2 PROJECT LOCATION



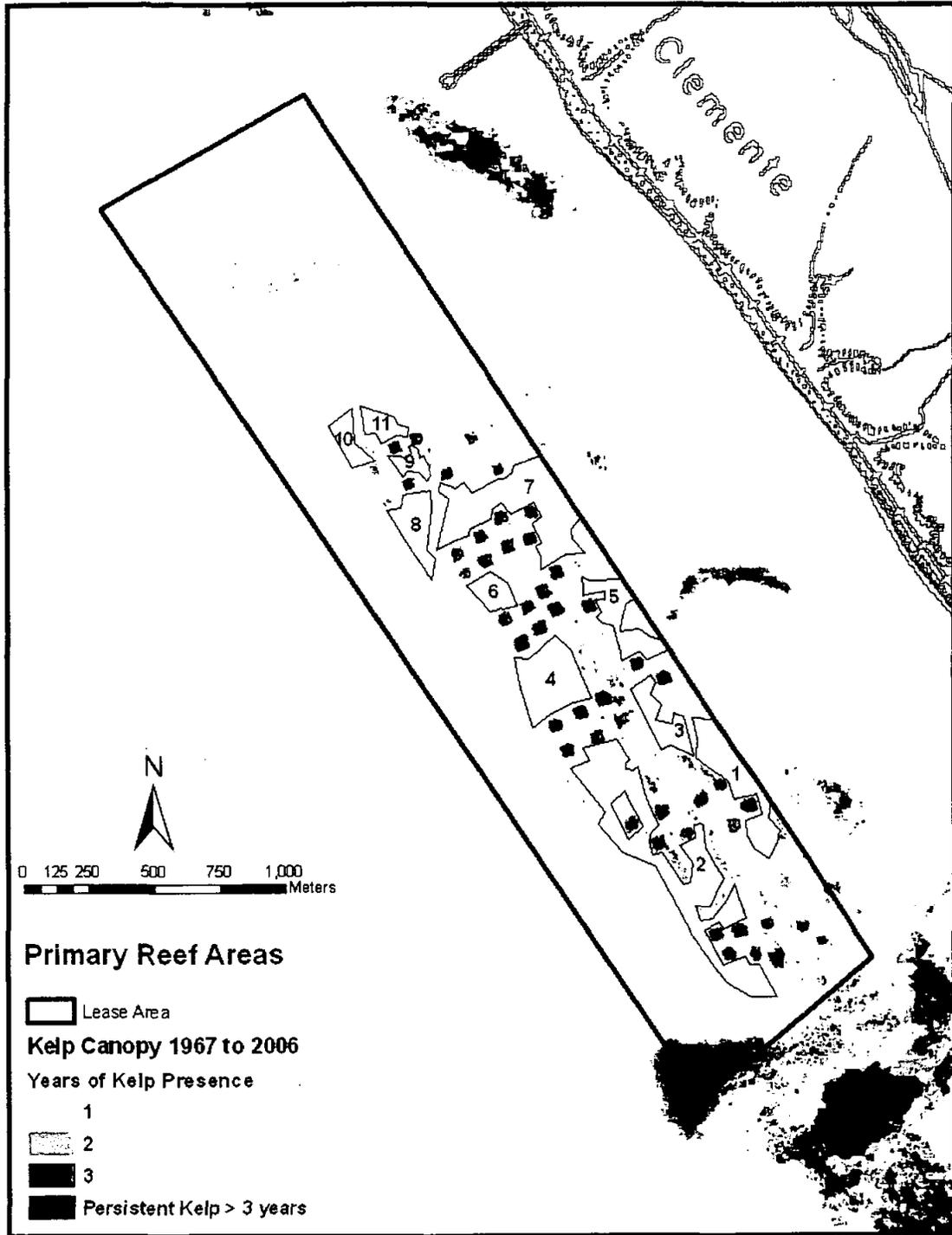
**ATTACHMENT 3a
 SITE MAP**



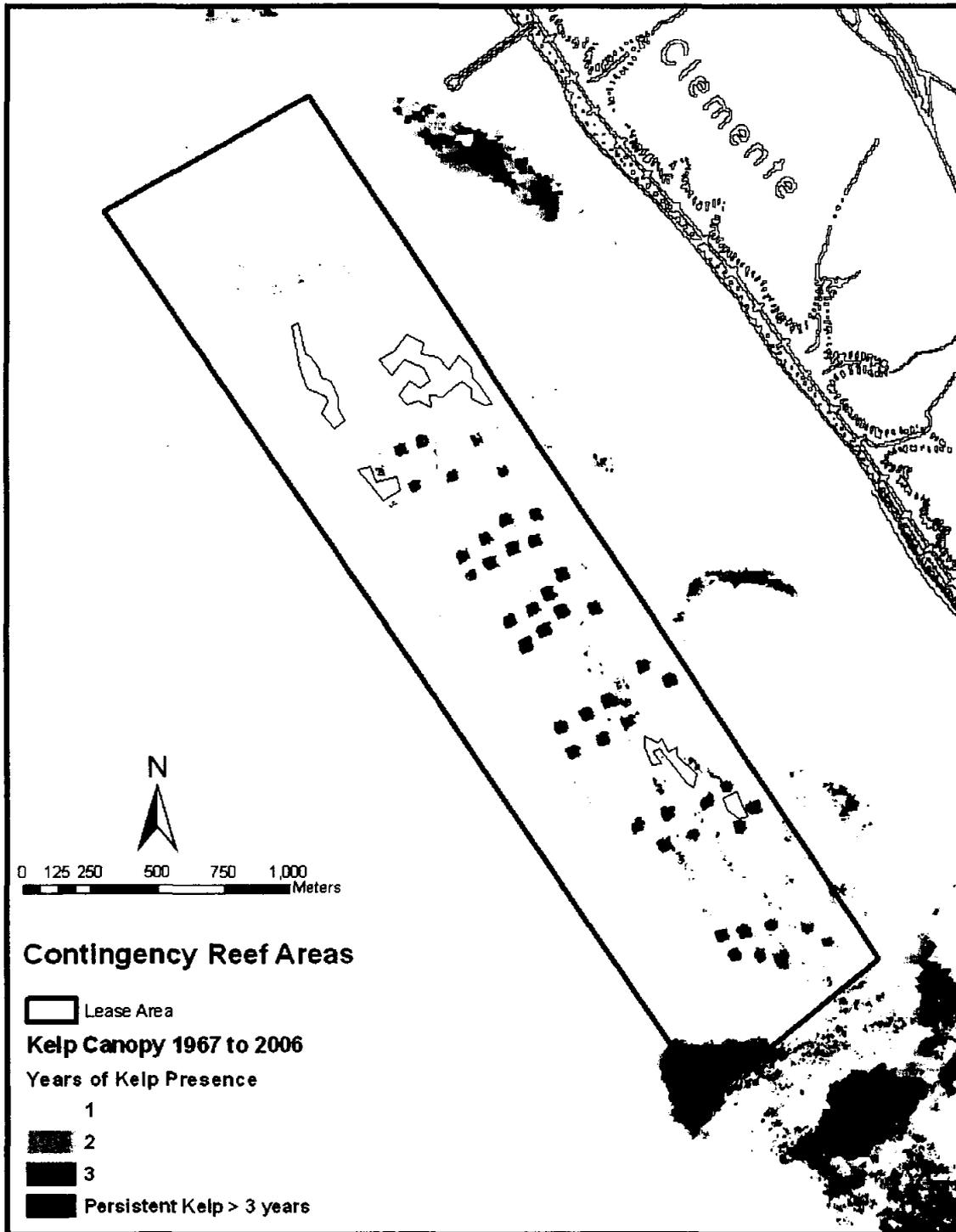
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ATTACHMENT 3b SITE MAP



**ATTACHMENT 3c
SITE MAP**



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ATTACHMENT 5 PHOTO DOCUMENTATION PROCEDURES

Standard Operating Procedure (SOP) 4.2.1.4

Photo Documentation Procedure

(CARCD 2001, Written by TAC Visual Assessments work group)

Introduction:

Photographs provide a qualitative, and potentially semi-quantitative, record of conditions in a watershed or on a water body. Photographs can be used to document general conditions on a reach of a stream during a stream walk, pollution events or other impacts, assess resource conditions over time, or can be used to document temporal progress for restoration efforts or other projects designed to benefit water quality. Photographic technology is available to anyone and it does not require a large degree of training or expensive equipment. Photos can be used in reports, presentations, or uploaded onto a computer website or GIS program. This approach is useful in providing a visual portrait of water resources to those who may never have the opportunity to actually visit a monitoring site.

Equipment:

Use the same camera to the extent possible for each photo throughout the duration of the project. Either 35 mm color or digital color cameras are recommended, accompanied by a telephoto lens. If you must change cameras during the program, replace the original camera with a similar one comparable in terms of media (digital vs. 35 mm) and other characteristics. A complete equipment list is suggested as follows:

Required:

- Camera and backup camera
- Folder with copies of previous photos (do not carry original photos in the field)
- Topographic and/or road map
- Aerial photos if available
- Compass
- Timepiece
- Extra film or digital disk capacity (whichever is applicable)
- Extra batteries for camera (if applicable)
- Photo-log data sheets or, alternatively, a bound notebook dedicated to the project
- Yellow photo sign form and black marker, or, alternatively, a small black board and chalk

Optional:

- GPS unit
- Stadia rod (for scale on landscape shots)
- Ruler (for scale on close up views of streams and vegetation)
- Steel fence posts for dedicating fixed photo points in the absence of available fixed landmarks

How to Access Aerial Photographs:

Aerial Photos can be obtained from the following federal agencies:

USGS Earth Science Information Center
507 National Center
12201 Sunrise Valley Drive
Reston, VA 22092
800-USA-MAPS

USDA Consolidated Farm Service Agencies
Aerial Photography Field Office
222 West 2300 South
P.O. Box 30010
Salt Lake City, UT 84103-0010
801-524-5856

Cartographic and Architectural Branch
National Archives and Records Administration
8601 Adelphi Road
College park, MD 20740-6001
301-713-7040

Roles and Duties of Team:

The team should be comprised of a minimum of two people, and preferably three people for restoration or other water quality improvement projects, as follows:

1. Primary Photographer
2. Subject, target for centering the photo and providing scale
3. Person responsible for determining geographic position and holding the photo sign forms or blackboard.

One of these people is also responsible for taking field notes to describe and record photos and photo points.

Safety Concerns:

Persons involved in photo monitoring should **ALWAYS** put safety first. For safety reasons, always have at least two 2 volunteers for the survey. Make sure that the

area(s) you are surveying either are accessible to the public or that you have obtained permission from the landowner prior to the survey.

Some safety concerns that may be encountered during the survey include, but are not limited to:

- Inclement weather
- Flood conditions, fast flowing water, or very cold water
- Poisonous plants (e.g.: poison oak)
- Dangerous insects and animals (e.g.: bees, rattlesnakes, range animals such as cattle, etc.)
- Harmful or hazardous trash (e.g.: broken glass, hypodermic needles, human feces)

We recommend that the volunteer coordinator or leader discuss the potential hazards with all volunteers prior to any fieldwork.

General Instructions:

From the inception of any photo documentation project until it is completed, always take each photo from the same position (photo point), and at the same bearing and vertical angle at that photo point. Photo point positions should be thoroughly documented, including photographs taken of the photo point. Refer to copies of previous photos when arriving at the photo point. Try to maintain a level (horizontal) camera view unless the terrain is sloped. (If the photo can not be horizontal due to the slope, then record the angle for that photo.) When photo points are first being selected, consider the type of project (meadow or stream restoration, vegetation management for fire control, ambient or event monitoring as part of a stream walk, etc.) and refer to the guidance listed on *Suggestions for Photo Points by Type of Project*.

When taking photographs, try to include landscape features that are unlikely to change over several years (buildings, other structures, and landscape features such as peaks, rock outcrops, large trees, etc.) so that repeat photos will be easy to position. Lighting is, of course, a key ingredient so give consideration to the angle of light, cloud cover, background, shadows, and contrasts. Close view photographs taken from the north (i.e., facing south) will minimize shadows. Medium and long view photos are best shot with the sun at the photographer's back. Some artistic expression is encouraged as some photos may be used on websites and in slide shows (early morning and late evening shots may be useful for this purpose). Seasonal changes can be used to advantage as foliage, stream flow, cloud cover, and site access fluctuate. It is often important to include a ruler, stadia rod, person, farm animal, or automobile in photos to convey the scale of the image. Of particular concern is the angle from which the photo is taken. Oftentimes an overhead or elevated shot from a bridge, cliff, peak, tree, etc. will be instrumental in conveying the full dimensions of the

project. Of most importance overall, however, is being aware of the goal(s) of the project and capturing images that clearly demonstrate progress towards achieving those goal(s). Again, reference to *Suggestions for Photo Points by Type of Project* may be helpful.

If possible, try to include a black board or yellow photo sign in the view, marked at a minimum with the location, subject, time and date of the photograph. A blank photo sign form is included in this document.

Recording Information:

Use a systematic method of recording information about each project, photo point, and photo. The following information should be entered on the photo-log forms (blank form included in this document) or in a dedicated notebook:

- Project or group name, and contract number (if applicable, e.g., for funded restoration projects)
- General location (stream, beach, city, etc.), and short narrative description of project's habitat type, goals, etc.
- Photographer and other team members
- Photo number
- Date
- Time (for each photograph)
- Photo point information, including:
 - Name or other unique identifier (abbreviated name and/or ID number)
 - Narrative description of location including proximity to and direction from notable landscape features like roads, fence lines, creeks, rock outcrops, large trees, buildings, previous photo points, etc. – sufficient for future photographers who have never visited the project to locate the photo point
 - Latitude, longitude, and altitude from map or GPS unit
- Magnetic compass bearing from the photo point to the subject
- Specific information about the subject of the photo
- Optional additional information: a true compass bearing (corrected for declination) from photo point to subject, time of sunrise and sunset (check newspaper or almanac), and cloud cover.

For ambient monitoring, the stream and shore walk form should be attached or referenced in the photo-log.

When monitoring the implementation of restoration, fuel reduction, or Best Management Practices (BMP) projects, include or attach to the photo-log a narrative description of observable progress in achieving the goals of the project. Provide supplementary information along with the photo, such as noticeable changes in habitat, wildlife, and water quality and quantity.

Archive all photos, along with the associated photo-log information, in a protected environment.

The Photo Point: Establishing Position of Photographer:

1. Have available a variety of methods for establishing position: maps, aerial photos, GPS, permanent markers and landmarks, etc. If the primary method fails (e.g., a GPS or lost marker post) then have an alternate method (map, aerial photo, copy of an original photograph of the photo-point, etc).
2. Select an existing structure or landmark (mailbox, telephone pole, benchmark, large rock, etc.), identify its latitude and longitude, and choose (and record for future use) the permanent position of the photographer relative to that landmark. Alternatively, choose the procedure described in *Monitoring California's Annual Rangeland Vegetation* (UC/DANR Leaflet 21486, Dec. 1990). This procedure involves placing a permanently marked steel fence post to establish the position of the photographer.
3. For restoration, fuel reduction, and BMP projects, photograph the photo-points and carry copies of those photographs on subsequent field visits.

Determining the Compass Bearing:

1. Select and record the permanent magnetic bearing of the photo center view. You can also record the true compass bearing (corrected for declination) but do not substitute this for the magnetic bearing. Include a prominent landmark in a set position within the view. If possible, have an assistant stand at a fixed distance from both the photographer and the center of the view, holding a stadia rod if available, within the view of the camera; preferably position the stadia rod on one established, consistent side of the view for each photo (right or left side).
2. Alternatively, use the procedure described in *Monitoring California's Annual Rangeland Vegetation* (UC/DANR Leaflet 21486, Dec. 1990). This procedure involves placing a permanently marked steel fence post to establish the position of the focal point (photo center).

PHOTO SIGN FORM: Print this form on yellow paper. Complete the following information for each photograph. Include in the photographic view so that it will be legible in the finished photo.

Location:

Subject Description:

Date:

Time: